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# From Childhood Trauma to Adult Dissociation: The Role of PTSD and Alexithymia

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## Key Words

Childhood trauma · Alexithymia · PTSD · Dissociation · Mediation analysis

## Abstract

**Background:** The mechanism of how childhood trauma leads to increased risk for adult dissociation is not sufficiently understood. We sought to investigate the predicting effects and the putatively mediating roles of PTSD and alexithymia on the path from childhood trauma to adult dissociation. **Methods:** A total of 666 day-clinic outpatients were administered the Childhood Trauma Questionnaire (CTQ), the Toronto Alexithymia Scale (TAS-20), the Posttraumatic Diagnostic Scale (PDS), and the Dissociative Experiences Scale (DES) and controlled for sex, age, and the Global Symptom Index (GSI). Linear regression analyses and mediation analyses were applied. **Results:** Independent predictive effects on dissociation were found for childhood trauma, alexithymia and PDS, even after adjusting for GSI. Effects of childhood neglect on dissociation were slightly stronger than of abuse. Alexithymia did not mediate the path from childhood trauma to dissociation. Mediation by PDS was specific for

childhood abuse, with all PTSD symptom clusters being significantly involved. **Conclusions:** Childhood abuse and neglect are important predictors of dissociation. While the effects of abuse are mediated by PTSD, the mechanism of how neglect leads to dissociation remains unclear. The results further support the predictive value of alexithymia for adult dissociation above and beyond the effects of childhood trauma, PTSD, and GSI scores.

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## Introduction

In the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders*, dissociative disorders are defined as ‘a disruption of and/or discontinuity in the normal integration of consciousness, memory, emotion, perception, body representation, motor control, and behavior. Dissociative symptoms can potentially disrupt every area of psychological functioning’ [1].

Numerous studies have demonstrated associations between childhood trauma and dissociation, and it has been suggested that in this context dissociative symp-

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toms serve as a defense mechanism against intolerable memories, thoughts, and feelings [2, 3]. While in the past, a direct path from childhood trauma to dissociation had been proposed, more recent research has questioned a direct strong relationship and shifted the attention to mediating factors and associated symptoms. Merckelbach and Muris [2] showed that direct associations between traumatic events and dissociation are rather moderate and suggested a mediating role of third factors like family pathology. Other researchers focused on trauma-related distress in its different forms, e. g. PTSD, borderline personality disorder, and bulimia. Their findings demonstrated trauma-related distress, and particularly PTSD, as being an important predictor for dissociation in subjects who had been exposed to traumatic events [for review, see 4]. Numerous studies found that dissociation occurring during or soon after the trauma, so-called peritraumatic dissociation, is an important risk factor for later development of PTSD. In their review and meta-analysis, Ozer et al. [5] reported that among different identified predictors, peritraumatic dissociation yielded the largest effect size as a predictor for adult PTSD. In addition, these subjects may develop a pattern of persistent dissociation in response to reminders of the traumatic situation [6]. Findings from different functional neuroimaging studies suggested that dissociation in PTSD patients represents a regulatory response of subjects exposed to states of psychological distress or extreme arousal [7, 8]. For example, Lanius et al. [9] in 2010 reported in their review about neurobiological correlates for a hyperinhibition of negative emotions in PTSD patients suffering from dissociation. In the face of traumatic memories, these patients showed an overactivation of medial prefrontal regions involved in the inhibition of structures of the limbic cortex. In contrast, a nondissociative undermodulated subtype with a predominance of hyperarousal and reexperiencing has been proposed [10]. However, dissociation as a mechanism of inhibition of limbic regions may prevent subjects from cognitively and emotionally processing negative emotions and traumatic memories [11]. Accordingly, different studies have demonstrated that persistent dissociation is a predictor of unbeneficial treatment outcome in trauma-focused approaches [12, 13]. Some authors have even suggested that PTSD is largely a dissociative disorder [14, 15]. In the current edition of the DSM-5, a dissociative subtype of PTSD was introduced [1]. This subtype is appropriate for subjects meeting the full diagnostic criteria for PTSD and additional symptoms of dissociation, particularly depersonalization and derealization [1].

Besides general or trauma-related stress, patient factors involved in the regulation of emotions, for example an alexithymic personality style, are considerably relevant mediators for the effects of childhood trauma on dissociation. Alexithymia has been described as a pattern of personality features including difficulties in identifying and describing feelings, poorly developed introspective thinking, and a lack of fantasy [16]. Ogrodniczuk et al. [17] summarized in their review that alexithymia is associated with poorer treatment outcome across different treatment approaches and diagnoses. Barrett et al. [18] reported about a strong relationship between poor emotion differentiation and insufficient emotion regulation. Thus, assuming that dissociation appears as a response to overwhelming emotional states, personality styles like alexithymia may be involved in its development. Grabe et al. [19] investigated the relationship between alexithymia and dissociation and found strong associations of the dimensions 'difficulties identifying feelings' and 'difficulties describing feelings' with pathological dissociation, even after controlling for general psychopathology. In a recent study, Powers et al. [20] in 2014 investigated the mediating role of emotional dysregulation on the path from PTSD to dissociation. Among the different dimensions of the 'emotion regulation' construct, alexithymia and the 'inability to use emotion regulation strategies' were the most important factors predicting dissociation.

Investigating the association between trauma and alexithymia, higher rates of alexithymia were found in patients with a history of childhood abuse [21, 22]. Zlotnick et al. [23] found associations between alexithymia, dissociation, and childhood sexual abuse in patients with self-mutilative behavior. However, other studies have argued that the presence of PTSD, not childhood trauma, is crucial for the development of alexithymic features. For example, alexithymia was found to be associated with the severity of PTSD symptoms but not with the severity of trauma in a sample of holocaust survivors [24]. In their meta-analysis, Frewen et al. [25] reported about associations of PTSD with alexithymia and especially with difficulties in identifying and labeling emotions. Moreover, if it represents a regulatory response to stress, it is left to be resolved whether this reaction (a) is specific to traumatic events, (b) depends on the development of PTSD or (c) is a rather unspecific reaction to general, psychological distress.

Taken together, dissociation and alexithymia show some conceptual and etiological parallels. Both are associated with a history of traumatic events and with current PTSD and have been suggested to serve as regulatory strategies for negative and threatening emotions and

thoughts. This goes along with a deficit in cognitive processing and regulation of emotions and, thus, with poorer psychotherapeutic treatment outcome. However, the path from childhood trauma to adult dissociation and its mediating factors remains insufficiently understood. While the direct pathway seems to be rather moderately strong, the role of associated traits and symptomatology like alexithymia and PTSD and their interaction deserves further attention. The following hypotheses were tested: (1) childhood trauma, PTSD, and alexithymia are independent predictors of adult dissociation as measured by the Dissociative Experiences Scale (DES), even when controlled for general psychopathology and (2) alexithymia and PTSD are significant mediators on the path from childhood abuse and neglect to adult dissociation after adjusting for general psychopathology.

## Materials and Methods

We invited a sample of 991 consecutively admitted patients of 6 outpatient day clinics in northeast Germany, all part of the University Hospital Greifswald Department of Psychiatry and Psychotherapy, to take part in this study. Of these, 778 agreed to participate; 112 patients were excluded due to missing data, leaving a final sample of 666 patients. At admission, the patients were routinely asked to complete a test compilation including the German versions of the Childhood Trauma Questionnaire (CTQ), the Posttraumatic Diagnostic scale (PDS), the DES, the revised Symptom Checklist-90 (SCL-90-R), and the 20-item version of the Toronto Alexithymia Scale (TAS-20). All participating patients gave written informed consent.

### Instruments

The SCL-90-R is a 90-item self-report scale widely used in clinical practice and in psychotherapy research. It includes 9 subscales reflecting different facets of psychopathology. Using these subscales, a summary score reflecting global psychopathological distress (Global Severity Index, GSI) can be generated. Validity and reliability of the original version as well as the German version have been shown [26, 27].

To assess dissociation, we used the German version of the DES (FDS) [28]. The DES is a frequently used, well validated self-report scale comprising 28 items that tap dissociation as a continuous variable [29]. Factor analysis identified 3 different subscales reflecting dissociative amnesia, absorption/imaginative involvement, and derealization/depersonalization. Reliability and validity of the German version have been shown to be comparable to the original version.

Diagnoses of PTSD were made using the PDS for the purposes of this study [30]. It comprises 49 items corresponding to the criteria A–F of the DSM-IV. The diagnoses of PTSD can be made if all 6 criteria are met. In a first step, a checklist including 12 potentially traumatic events is provided covering DSM-IV criterion A1 (range of qualifying stressors). In the case of more than 1 trauma, subjects are asked to refer to the most distressing event when completing the following sections, including criterion A2 (personal re-

sponse of intense fear, helplessness, or horror) and the PTSD symptom clusters B (5 items, intrusions), C (7 items, avoidance and emotional numbing), and D (5 items, arousal symptoms). The frequency of each of the 17 symptoms in the past month is rated on a 4-point scale (0 = not at all or only 1 time, 3 = 5 or more times a week/almost always). The presence of 2 or more symptoms within each of the PTSD symptom clusters leads to the diagnosis of PTSD. Additionally, the scale allows quantification of symptom severity by summing the individual's responses to the PTSD symptom clusters of intrusions, avoidance, and arousal.

Childhood trauma was assessed using the 34-item version of the CTQ, a widely used self-report scale. It comprises 5 different subscales: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Responses are made on a 5-point Likert-type scale to express the frequency of occurrence and ranges from 'never true' to 'very often true'. Validity and reliability have previously been demonstrated [29]. Dimensional scoring procedures were used in regression analyses. The manual also provides threshold scores to determine the severity of abuse and neglect dimensions (none = 0, mild = 1, moderate = 2, and severe to extreme = 3). These were used in the mediation analyses, as this statistical method requires dichotomous independent variables. A subject was rated as positive for overall abuse/neglect when a severity score of  $\geq 2$  (at least moderate) was reported at least in 1 of the subdimensions [31].

### Statistical Analysis

The descriptive statistics were assessed with the *t* test or  $\chi^2$  test in the case of continuous and factor variables, respectively. As preliminary analyses, linear regression models with 2,000 bootstrap replicates were performed on the predictive power of CTQ, PDS, TAS-20, and GSI on the dependent variable DES, adjusted for sex and age. To calculate the individual predictive power of the different factors, we assessed the increase in  $R^2$  for each psychometric variable compared to a basis model only including age and sex. As all variables were associated with DES the final model included TAS-20, PDS, CTQ, and GSI (all taken as continuous scores). Additional regression analyses were performed using childhood abuse and neglect as dichotomous variables to calculate the individual effect of the specific type of trauma and their interaction effects. Mediation analyses were performed with the 'medeff' function from the mediation package for STATA [32], which allows for the examination of the mediating effects of PDS score and the different symptom clusters and TAS-20 on the path from CTQ to DES. As this statistical approach requires a dichotomous independent variable, the paths from childhood abuse and neglect were examined separately using the cutoff scores shown above. PDS and TAS scores were treated as continuous variables. Medeff reports the summary estimates of the mediation, direct, and total effects after 1,000 simulations. Finally, medeff also reports the average causal mediation effect (ACME) from the simulations and the percentage of effect mediated. The significance of the effect can be obtained by the confidence interval (CI). If the 95% CI excludes 0, then the two-sided *p* value is significant on an  $\alpha$ -level of 5%. We calculated models including both mediators simultaneously. All models were adjusted for sex, age, and GSI. To account for the skewness of our outcome variable DES (skewness = 1.39, kurtosis = 5.31), we used bootstrapping in the linear regression and simulations in the mediator analysis. Statistical analyses were performed using STATA/MP software, version 13 (StataCorp LP, College Station, Tex., USA).

**Table 1.** Sociodemographic characteristics and diagnostic categories of the total sample and a comparison of subgroups

	Total sample (n = 666)	Not alexithymic TAS ≤60 (n = 452)	Alexithymic TAS >60 (n = 214)	Statistics (TAS ≤60 vs. TAS >60)
Age, years	42.6±11.9	43.6±12.2	40.6±11.0	d.f. = 664; p = 0.003
Sex				$\chi^2 = 9.1$ ; d.f. = 1; p = 0.003
Male	198 (29.7)	151 (33.4)	47 (22)	
Female	468 (70.3)	301 (66.6)	167 (78)	
Education (school years)				$\chi^2 = 5.5$ ; d.f. = 5; p = 0.36
No graduation	7 (1.0)	6 (1.3)	1 (0.5)	
<10 years	92 (13.7)	61 (13.5)	31 (14.5)	
10 years	435 (65.3)	290 (64.2)	145 (67.8)	
>10 years	109 (16.4)	82 (18.1)	27 (12.6)	
Other	23 (3.4)	13 (2.9)	10 (4.7)	
Marital status				$\chi^2 = 4.3$ ; d.f. = 5; p = 0.5
Single	206 (30.9)	135 (29.9)	71 (33.2)	
Married	291 (43.7)	194 (42.9)	97 (45.3)	
Separated	34 (5.1)	24 (5.3)	10 (4.7)	
Divorced	107 (16.1)	79 (17.5)	28 (13.2)	
Widowed	22 (3.3)	17 (3.8)	5 (2.3)	
Married again	6 (0.9)	3 (0.7)	3 (1.4)	
Treatment diagnosis				$\chi^2 = 9.0$ ; d.f. = 6; p = 0.18
Alcohol/drug dependence	6 (0.9)	3 (0.7)	3 (1.4)	
Psychotic disorders	4 (0.7)	2 (0.4)	2 (0.9)	
Depressive episode(s)	498 (76.5)	351 (77.7)	147 (68.7)	
Anxiety/somatoform disorders	108 (15.8)	67 (14.8)	41 (19.2)	
Eating disorders	2 (0.2)	2 (0.4)	0 (0.0)	
Personality disorders	37 (4.9)	20 (4.4)	17 (7.9)	
Other	11 (1.2)	7 (1.5)	4 (1.9)	
DES	15.8±11.9	13.0±10.0	21.9±13.4	d.f. = 664; p < 0.001
CTQ	45.6±17.5	44.0±16.2	49.0±19.6	d.f. = 664; p < 0.001
Abuse (yes)	243 (36.5)	143 (31.6)	100 (46.7)	
Neglect (yes)	305 (45.8)	198 (43.8)	107 (50.0)	
TAS-20	55.4±11.2	49.6±8.0	67.6±5.8	d.f. = 664; p < 0.001
PTSD	178 (26.7)	92 (20.4)	86 (40.2)	$\chi^2 = 29.2$ ; d.f. = 1; p < 0.001
PDS	5.1±5.2	4.1±4.7	7.1±5.6	d.f. = 664; p < 0.001
PDS (reexperiencing)	1.5±1.8	1.2±1.7	2.0±2.1	d.f. = 664; p < 0.001
PDS (avoidance and emotional numbing)	1.9±2.2	1.5±2.0	2.6±2.3	d.f. = 664; p < 0.001
PDS (arousal)	1.8±1.8	1.4±1.6	2.5±1.9	d.f. = 664; p < 0.001
GSI	1.43±0.66	1.2±0.6	1.9±0.6	d.f. = 664; p < 0.001
SCL-90-R subscales				
Somatization	1.08±0.76	0.91±0.66	1.44±0.83	d.f. = 664; p < 0.001
Obsessive-compulsive	1.42±0.87	1.22±0.78	1.83±0.88	d.f. = 664; p < 0.001
Interpersonal sensitivity	1.17±0.90	0.94±0.73	1.63±1.02	d.f. = 664; p < 0.001
Depression	1.41±0.85	1.2±0.75	1.85±0.9	d.f. = 664; p < 0.001
Anxiety	1.15±0.84	0.93±0.72	1.61±0.89	d.f. = 664; p < 0.001
Hostility	0.89±0.78	0.74±0.69	1.21±0.85	d.f. = 664; p < 0.001
Phobic anxiety	0.92±0.93	0.69±0.75	1.41±1.08	d.f. = 664; p < 0.001
Paranoid ideation	1.03±0.81	0.87±0.73	1.39±0.87	d.f. = 664; p < 0.001
Psychoticism	0.75±0.78	0.59±0.75	1.07±0.73	d.f. = 664; p < 0.001

Values are means ± SD or n (%), as appropriate.



**Table 2.** Linear regression analysis of the full model including GSI, TAS-20, PDS, and CTQ (n = 666), with DES as the dependent variable (after 2,000 bootstrap replicates)

Predictor	$\beta$	SE	t value	p value	95% CI
CTQ	0.10	0.02	4.23	2.8E-5	0.05 to 0.14
TAS-20	0.14	0.04	3.63	4.7E-4	0.06 to 0.22
PDS	0.42	0.09	4.89	7.2E-7	0.26 to 0.59
GSI	6.78	0.83	8.09	2E-16	5.17 to 8.40
Age	-0.13	0.03	-4.28	1.7E-5	-0.19 to -0.07
Sex	2.36	0.79	2.94	2.7E-3	0.82 to 3.90

p values two-sided,  $R^2 = 42\%$ . SE = Standard error.

**Table 3.** Two-mediator analysis, with TAS-20/PDS as mediator, childhood abuse (dichotomous) as exposure, DES as dependent variable, and sex, age, and GSI as covariables (n = 666)

	Mean	95% CI
<i>Childhood abuse</i>		
Effect of TAS-20 adjusted for PDS		
ACME	0.071	-0.16 to 0.34
Direct effect	1.898	0.39 to 3.44*
Total effect	1.969	0.39 to 3.54*
% of TME	0.036	0.02 to 0.13
Effect of PDS adjusted for TAS-20		
ACME	0.547	0.17 to 1.01*
Direct effect	1.898	0.39 to 3.44*
Total effect	2.446	0.86 to 4.04*
% of TME	0.225	0.13 to 0.63

TME = Total mediated effect. \*  $p < 0.05$ .

**Table 4.** Two-mediator analysis, with TAS-20/PDS as mediator, childhood neglect (dichotomous) as exposure, DES as dependent variable, and sex, age, and GSI as covariables (n = 666)

	Mean	95% CI
<i>Childhood neglect</i>		
Effect of TAS-20 adjusted for PDS		
ACME	0.058	-0.15 to 0.30
Direct effect	2.415	0.98 to 3.88*
Total effect	2.473	0.98 to 3.96*
% of TME	0.024	0.01 to 0.06
Effect of PDS adjusted for TAS-20		
ACME	0.023	-0.31 to 0.37
Direct effect	2.415	0.98 to 3.88*
Total effect	2.438	0.89 to 3.95*
% of TME	0.010	0.01 to 0.03

TME = Total mediated effect. \*  $p < 0.05$ .

## Results

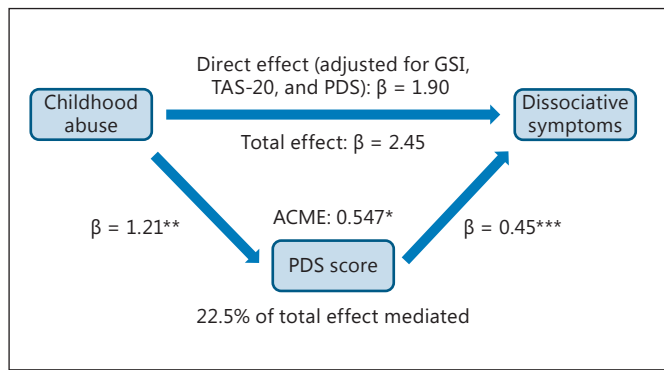
Table 1 presents basic sociodemographic data. A total of 666 participants were included in the sample (mean age:  $42.6 \pm 11.9$  years); 468 (70.3 %) of the subjects were female. In total, 178 (26.7%) patients suffered from PTSD according to information derived from the PDS scale; 214 patients (32.1%) had TAS-20 scores  $>60$ , thus being regarded as alexithymic according to common cutoff scores.

### Regression Models

Results of the linear regression analysis are presented in table 2. The basic model, only including age and sex, had an  $R^2$  of 2.9%. Individually adding psychometric variables led to an increase in  $R^2$  of 9.2% for CTQ, 17.3% for TAS-20, 19.9% for PDS, and 32.7% for GSI. Including all psychometric variables in the final model showed that all variables served as independent predictors of DES (d.f. = 6, 659), including TAS-20 ( $\beta = 0.142$ ;  $p < 0.001$ ,  $t = 3.63$ ) and PDS ( $\beta = 0.42$ ,  $p < 0.001$ ,  $t = 4.89$ ) (table 2). The explained variance ( $R^2$ ) was 41.7%. However, GSI was by far the most important predictor in the model ( $\beta = 6.78$ ;  $p < 0.001$ ,  $t = 8.09$ ). This was due to the high correlation of GSI and DES in our sample ( $r = 0.58$ ). Replacing CTQ by the 2 dimensions abuse and neglect, we found a slightly higher effect size of childhood neglect ( $\beta = 1.78$ ,  $p = 0.033$ ) than of childhood abuse ( $\beta = 1.64$ ,  $p = 0.066$ ) on DES adjusted for GSI, sex, and age. Correlation analyses showed a strong correlation of both types of trauma ( $r = 0.5$ ), but no significant interaction between childhood abuse and neglect was found on DES.

### Mediation Analyses

As we needed a dichotomous exposure in the mediation analyses, we investigated childhood abuse and neglect separately. Both facets of childhood trauma are measured with the CTQ. Tables 3 and 4 and figure 1 present the results of mediation analyses for the path from childhood abuse or neglect to DES. The mediating roles of TAS-20 and PDS were investigated jointly in a single pathway analysis model, and each model was applied on the total sample and adjusted for sex, age, and GSI. PDS emerged as significant mediator in the model for abuse (table 3), but not for neglect (table 4), with a total mediated effect of 22.5% (ACME = 0.55, 95% CI: 0.17–1.01). Alexithymia was not found to serve as a mediator. Regarding the three different symptom clusters for the PDS score, reexperiencing, avoidance, and emotional numbing and arousal, results were comparable to those of the full PDS score (online suppl. tables S1–S6;



**Fig. 1.** Mediator model for childhood abuse displaying effect estimates and percent effect mediated on the path from childhood abuse to dissociative symptoms. TAS-20 and PDS were treated as continuous variables. Only significant mediators are shown. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

see [www.karger.com/doi/10.1159/000449004](http://www.karger.com/doi/10.1159/000449004) for all online suppl. material). In sensitivity analyses, strong mediating effects were found for TAS-20 as well as PDS in the abuse model (data shown in online suppl. tables S7, S8) when models were not adjusted for GSI. This indicates that a general psychopathology itself has a mediating effect on DES.

In summary, regression analyses revealed an independent prediction of dissociation by childhood trauma, alexithymia, and PDS, even after adjusting for general symptom severity, thus confirming hypothesis 1. Additional mediation analyses showed a mediating effect of PDS, but not of alexithymia, in the path from childhood abuse to adult dissociation. No mediating effect of alexithymia and PDS was observed when childhood neglect instead of abuse was entered as exposure. Therefore, hypothesis 2 was only partly confirmed.

## Discussion

In this cross-sectional study, we aimed to further clarify the predictive effect and the putatively mediating roles of alexithymia and PTSD in the path from childhood trauma to adult dissociation. The main findings of this study were as follows: (a) alexithymia predicts adult dissociation above and beyond the effects of GSI scores, PTSD, and childhood trauma, (b) alexithymia does not mediate the path from childhood trauma to adult dissociation, (c) a mediating effect of PDS was specific for exposure to childhood abuse and (d) childhood neglect

shows slightly stronger effects on the development of adult dissociation compared to childhood abuse.

The relationship between alexithymia and dissociation has been the subject of various studies [19, 33, 34]. Still, our analyses were adjusted for the different aspects of childhood trauma and PTSD, being significant predictors for dissociative symptoms themselves, thereby confirming hypothesis 1 and extending the results of previous studies. Moreover, analyses of the PTSD symptom clusters reexperiencing, avoidance, and emotional numbing and arousal showed that these factors had similar effect sizes on the development of dissociation and that all factors acted independently from the effect of alexithymia. This is particularly interesting since other authors argued that alexithymia in PTSD patients is better explained as the ‘emotional numbing’ aspect of PTSD [35, 36]. This finding supports the concept of alexithymia representing distinctive personality features, acting independently from the emotional numbing factor of PTSD in the etiology of dissociation.

Contrary to our hypothesis 2, alexithymia was not found to mediate the path from childhood trauma to dissociation after adjusting for GSI scores. In detail, our mediation analyses revealed the association between childhood trauma and alexithymia to depend on the level of general psychological distress, while the link between alexithymia and dissociation was independent from GSI scores. Still, without adjusting for GSI scores, we found a strong mediating effect of alexithymia on the path from both childhood abuse and childhood neglect to adult dissociation. These findings raise the question for the mechanism of how childhood trauma, general psychopathology, alexithymia, and dissociation are linked. Different studies demonstrated that alexithymia may at least in part represent a response to distress imposed by abuse [22, 37] and neglect [38] during childhood. The reduced ability to identify, describe, and communicate one’s own feelings has been shown to impair the capacity to adapt to stressful situations in later life, going along with elevated levels of psychological distress [39, 40]. The ‘difficulties in identifying feelings’ factor, in particular, was demonstrated to be a strong predictor of psychopathology, highlighting the importance of insight and the identification of one’s feelings for the regulation of psychological distress [41]. In turn, severe states of psychological distress including depression, anxiety, and anger have been shown to predict proneness to adult dissociation [42, 43]. This concept corresponds to the findings of Elzinga et al. [33], reporting that dissociation is a reaction to stressful events, which may be mediated by the difficulties in identifying feelings.

Other authors emphasize the role of emotional dysregulation, which shares some features with alexithymia, including impaired awareness and understanding of one's emotions, for the development of trauma-related psychopathology [44] and dissociative symptoms in particular [20]. An alternative view holds that dissociation is a response to arousal rather than to psychopathology. Support for this model comes from fMRI data published by Felmingham et al. [45] and demonstrating that dissociation in PTSD patients is in part a regulatory process invoked to automatic hyperarousal in reaction to threat. Sterlini and Bryant [46] showed that hyperarousal and anxiety were strongly predictive for peritraumatic dissociation in first-time skydivers. At the same time, increased autonomic arousal and slower habituation after exposure to negative emotional stimuli have been shown to be associated with alexithymia [47]. Taylor et al. [48] suggested that alexithymia as a response to stress is accompanied by prolonged states of emotional arousal.

In summary, our findings show that alexithymia, being associated with general psychological distress which may at least in part be imposed by childhood trauma, increases the risk for adult dissociation. Based on previous research, it can be speculated that alexithymia goes along with the reduced ability to regulate states of negative affectivity, which in the context of stressful situations may lead to elevated levels of general psychopathology and hyperarousal. This may increase the risk of becoming affectively overwhelmed and, thus, of developing dissociation.

Consistent with previous studies, our findings provide additional evidence for a strong relationship between exposure to childhood trauma and adult dissociation over and above the effects of alexithymia, PTSD, and GSI scores. While the vast majority of existing studies have focused on childhood abuse, particularly sexual abuse [for review, see 2], our findings highlight the role of childhood neglect in the development of adult dissociation. In their review on the causal link between childhood trauma and dissociation, Merckelbach and Muris [2] mention various studies on the predictive effect of childhood abuse, while a possible relationship between neglect and dissociation is not explicitly included. However, the authors emphasize that in different studies, the relationship between childhood abuse and dissociation disappeared when neglect in terms of family pathology or negative family atmosphere were entered as covariates. For example, Draijer and Langeland [49] defined childhood neglect as parental dysfunction or unavailability. They found maternal dysfunction, besides sexual and physical abuse, to best predict dissociative symptoms in adult in-

patients. The authors concluded that the role of early attachment between parent and child and supportive relationships are of high relevance particularly at the time or after the abuse. Van der Kolk et al. [50] calculated, in their 4-year follow-up study on highly traumatized patients, correlation coefficients of childhood neglect and childhood abuse with DES scores. They reported about highly significant correlations for both exposures, with even higher coefficients for neglect. In the same study, the authors investigated the impact of these adverse childhood experiences on self-destructive behavior, coming to a remarkable conclusion: while traumatic experiences in terms of abuse contributed to the initiation of self-destructive behavior, neglect and lack of secure attachment helped to maintain the symptoms. Taking these results into account, it could be speculated that the effects of childhood abuse and neglect may interact in a way that increased dissociation is a response to trauma-related distress like PTSD imposed by abuse, while neglect is responsible for poorer compensatory resources. This hypothesis is supported by the finding that mediation by PDS scores was specific for childhood abuse, while neglect showed no significant associations with PDS scores after adjusting for GSI. However, our additional analyses on interactional or additive effects between childhood abuse and neglect did not reveal significant results. Still, our result of slightly stronger effect sizes of childhood neglect than of abuse indicates that experiences of emotional or physical neglect during childhood play a more important role in the etiology of dissociation than has been acknowledged as yet. Longitudinal studies investigating the long-term impact of neglect and interactions with stressful life situations seem an interesting field for future studies.

These findings suggest some implications for treatment approaches for PTSD patients. Alexithymic symptoms are worth assessing prior to the beginning of treatment. In patients identified as being alexithymic, special focus may be given to the development of insight and clarification of emotional states. Psychotherapeutic approaches in the treatment of patients suffering from dissociation should respect the special needs of patients who experienced neglect in their childhood. For instance, the therapeutic relationship may even be more important, and the therapist should be prepared to be confronted with problems like persistent distrust.

Our data were collected in a naturalistic, cross-sectional study comprising a broad variety of diagnoses. This goes along with several methodological limitations that should be acknowledged. First, as we did not evaluate the

chronological order of the investigated factors, no temporal or causal conclusions can be drawn. Second, all applied instruments were self-report questionnaires. Although extensively used in research and clinical practice and well validated, it may be especially challenging for alexithymic patients, who are characterized by a reduced affective insight, to report adequately about their emotional state. Additionally, the impaired ability to recall aspects of traumatic events, representing a typical feature of PTSD, may reduce the reliability of given information. In particular, as the diagnosis PTSD was based upon the PDS scale and has not been cross-validated by a clinician, the diagnosis must be considered as presumptive. Still, previous studies reported good agreement with the PTSD module of the Structured Clinical Interview for DSM Disorders [30]. Third, previous research has identified factors like trait anxiety, hostility, impulsivity [51], emotional dysregulation [20, 52], or self-transcendence and self-directedness [53] to significantly predict dissociation.

These more trait-dependent factors may have interacted with the patient's characteristics in our study, thus further limiting the conclusions of this study. A comprehensive analysis taking other state and trait factors and their inter-relationship into account would represent an interesting approach worth addressing in future studies.

In conclusion, our study provides robust evidence for the independent predicting effects of childhood trauma, alexithymia, and PTSD over and above the effects of general psychological distress in the development of adult dissociation. Additionally, our study provides further evidence for the high relevance of childhood neglect in the etiology of adult dissociation. As the 'direct effects' of both abuse and neglect were considerably strong, in future studies factors other than alexithymia and PTSD need to be investigated as possible mediators for adult dissociation. Moreover, it is still left to be resolved which mechanism actually explains the association between alexithymia and dissociation.

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